

*COMPARATIVE ANALYSIS
OF THE INFLUENCE OF HANDGRIP STRENGTH
AND MOBILITY ON THE QUALITY
OF LIFE OF INSTITUTIONALIZED ELDERLY*

Marina Celly Martins Ribeiro de Souza¹
Lucas Guyt²
Carolina Marques Borges³
Natália de Cássia Horta⁴
Tatiana Teixeira Barral Lacerda⁵
Maria da Consolação Magalhães Cunha⁶
Poliana Fialho de Carvalho⁷

1 Graduada em Enfermagem. Doutora em Enfermagem. Professora Associada em The College of New Jersey, vinculada ao Department of Public Health. E-mail: desouzam@tcnj.edu.

2 Estudante de Graduação em Saúde Pública no The College of New Jersey. E-mail: guyt11@tcnj.edu.

3 Graduada em Odontologia. Doutora em Saúde Coletiva. Professora Associada em The College of New Jersey, vinculada ao Department of Public Health. E-mail: borgesc@tcnj.edu.

4 Graduada em Enfermagem. Doutora em Enfermagem. Professora Associada da Pontifícia Universidade Católica de Minas Gerais (PUC-MG) vinculada ao departamento de Enfermagem. E-mail: nataliahorta@pucminas.br.

5 Graduada em Fisioterapia. Mestre em Ciências da Reabilitação. Professora Associada da Pontifícia Universidade Católica de Minas Gerais (PUC-MG) vinculada ao departamento de Fisioterapia. E-mail: tatiana.barral@yahoo.com.br.

6 Graduada em Medicina Veterinária. Mestre em Saúde Pública. Professora Associada da Pontifícia Universidade Católica de Minas Gerais (PUC-MG) vinculada ao departamento de Enfermagem. E-mail: consolacaocunha@uol.com.br.

7 Graduada em Fisioterapia. Especialização em Geriatria e Gerontologia. Técnica Superior em Saúde na Prefeitura Municipal de Belo Horizonte. E-mail: polianafcarvalho@gmail.com.

abstract

The objective of this study was to carry out a comparative analysis between handgrip strength and mobility in the quality of life (QOL) of older adults living in long-term care facilities. Methods: This was a cross sectional study conducted in Belo Horizonte, Brazil, comprised of a sample population of 127 older adults. Measurements included the World Health Organization Quality of Life-OLD (WHOQOL-BREF) questionnaire, assessment of the handgrip strength by hand dynamometer and mobility by Timed Up and Go (TUG). An analysis of variance (ANOVA) was performed to compare the mean values of the WHOQOL-BREF, global and domains, in each stratum of the handgrip strength and mobility values. Our results showed that handgrip dynamometer strength was associated with higher perception of the global WHOQOL-BREF score and two WHOQOL-BREF domains environment ($p < 0.028$) and physical health ($p < 0.002$), that is, the highest QOL values were seen in those older adults with greater handgrip strength. However, no significant association between TUG score and any quality of life domains was found. It can be inferred that handgrip strength seems to influence the quality of life of institutionalized older adults and healthcare providers in LTCs should account for when designing interventions.

keywords

Muscle strength dynamometer. Quality of life. Aged. Homes for the aged.

1 Introduction

The population of Brazil is ageing at a rapid pace due to the factors of a falling birth rate and a climbing life expectancy. The older adult population increased 40.3% just between the years 2002 and 2012, while estimates project the ratio of older adults to young people to increase from 39/100 in the year 2010 to 153/100 in the year 2040 (MIRANDA *et al.*, 2016; NETUVELI; BLANE, 2008; VITORINO; PASKULIN; VIANNA, 2012). Compounded by the increased risk of institutionalization associated with advanced age, the population of older adults residing in Long-Term Care facilities (LTCs) will inevitably skyrocket in the coming years (HAIDER *et al.*, 2016; VITORINO; PASKULIN; VIANNA, 2013; MIRANDA *et al.*, 2016). Research has shown particular attention

should be paid to the Quality of Life (QoL) of older adults residing in Long-term care facilities due to negative health outcomes associated with their institutionalization and generally advanced age compared to Older adults in the community (SOUZA-KOCK; BISETTO, 2017; NETUVELI; BLANE, 2008; TAVARES; DIAS, 2012).

Quality of Life (QoL) describes a person's overall sense of well-being through the combined analysis of objective and subjective dimensions across psychological, social, and physical domains (FLECK; CHACHAMOVICH; TRENTINI, 2006; NETUVELI; BLANE, 2008). The inherent multidimensional quality of the QoL measurement reveals the holistic nature of its impacts on well-being across the lifespan. A factor which affects one dimension of QoL can also affect others (FLECK; CHACHAMOVICH; TRENTINI, 2006; VITORINO; PASKULIN; VIANNA, 2012). Advanced age is associated with a host of negative physical, psychological, and social factors of the QoL, such as increased dependence due to frailty, social isolation, and decreased cognitive functioning, all of which increase the likelihood of institutionalization in LTCs later in life (RODRIGUES; MOLNAR; ABREU, 2016; TAVARES; DIAS, 2012). This has served to emphasize the need for elder care providers to identify efficient and efficacious means of ameliorating the negative factors of QoL related to health status in LTC residents through interventions that address functional incapacities (LACERDA *et al.*, 2017; LUCA *et al.*, 2011; VITORINO; PASKULIN; VIANNA, 2012; TAVARES; DIAS, 2012; WHO, 1996).

Functional capacity, generally defined as the ability to complete Activities of Daily Living, in Older adults has been proven to have a significant, negative correlation with health status (PAULA *et al.*, 2014; TAVARES; DIAS, 2012). Mobility is one determinant of functional capacity; the inability to ambulate safely can lead to a loss of independence and reliance on others for aid to prevent falls, which has been shown to be a negative factor of Quality of Life (FABER *et al.*, 2017; TAVARES; DIAS, 2012). Factors related to this effect are of particular concern for older adults residing in LTCs, as some research has shown they exhibit lower levels of total independence and greater rates of frailty than their peers residing in the community (SOUZA-KOCK; BISETTO, 2017; RODRIGUES; MOLNAR; ABREU, 2016). That said, this effect is not necessarily universal; a study by Cucato *et al.* (2016) found no significant difference between the functional performance of institutionalized and community older adults.

Despite the incipient demographic shift of older adults, there is a dearth of information regarding the QoL of older adults residing in LTCs overall, let alone the disparities between types of LTCs (LACERDA *et al.*, 2017; MIRANDA *et al.*, 2016; VITORINO; PASKULIN; VIANNA, 2012). The nascent challenge

necessitates the identification of potential physical influences on dimensions of QoL to improve the applicability and effectiveness of treatments in addressing overall wellbeing for older adults residing in LTCs (LACERDA *et al.*, 2017; LUCA *et al.*, 2011; SOUZA-KOCK; BISETTO, 2017; RODRIGUES; MOLNAR; ABREU, 2016; TAVARES; DIAS, 2012; TOMICKI *et al.*, 2016). Due to their relevance with frailty in older adults, measures concerning strength and risk of falls offer a potentially significant insight for the selection of efficacious avenues of treatment with multidimensional outcomes (HAIDER *et al.*, 2016; TOMICKI *et al.*, 2016).

2 Purpose

Thus, the primary objective of the present study was to carry out a comparative analysis between handgrip strenght and mobility in the quality of life of the Brazilian elderlies that reside in long term care facilities.

3 Methods

This cross-sectional study was part of a comprehensive project that evaluated 156 public long-term care facilities located in 34 municipalities of the Metropolitan Region of Belo Horizonte, in the State of Minas Gerais, in 2017 (LACERDA *et al.*, 2017). Sampling and recruitment were based on the lottery system, which considered the universe of institutionalized older adults who lived in long-term care facilities by the time of our data collection. Exclusion criteria for this study was limited to initial refusal of participation and a demonstration of cognitive deficiencies assessed by the Mental State Mini Exam that was administered to those selected by the lottery to avoid cognitive deficiencies acting as a confounder (BRUCKI *et al.*, 2013). In situations of not reaching the minimum score of the Mental State Mini Exam, another individual was recruited until surpassed the required sample. The parameters utilized for sample calculation were prevalence of 58% of the Quality of Life domain, considering an estimation error of 10% and confidence level of 90%, totalizing 119 participants, chosen by lot. The study was approved by Research Ethics Committee of PUC Minas, number 31471114.4.0000.5137).

3.1 Measurements

3.1.1 Quality of Life (QoL)

A dual administration of the Brazilian World Health Organization Quality of Life-BREF [WHOQOL-BREF] was used to assess QOL. Designed for international application and tested in Brazil during its development, the WHOQOL-BREF has shown consistent validity for all domains (FLECK; CHACHAMOVICH; TRENTINI, 2006; WHO, 1996). The WHOQOL-BREF is a 26 questions survey of QoL based on four domains: Physical Health, Psychological Health, Social Relationships, and Environment, is a condensed version of the full WHOQOL-100 questionnaire (FLECK; CHACHAMOVICH; TRENTINI, 2006). A high score in total and each subscale reflects a good QoL, while a low score indicates a poor QoL. In order to validate this instrument for the Brazilian population, it was applied in a sample of 424 elderly people in the city of Porto Alegre-RS, in the year of 2005. (FLECK; CHACHAMOVICH; TRENTINI, 2006). The instrument showed satisfactory characteristics of internal consistency (Cronbach coefficients of 0.71 to 0.88), discriminant validity ($p < 0.01$), concurrent validity (correlation coefficients between -0.61 and -0.50) and test-retest reliability (correlation coefficients between 0.58 to 0.82).

3.1.2 Handgrip Strength

Dynamometer-assessed Handgrip Strength (HS) is a measurement of manual gripping force which has demonstrated good reproducibility and excellent inter-rater reliability (ROBERTS *et al.*, 2011). The test utilized a dynamometer (JAMAR, Hatfield, PA, USA) for measurement of HS, which were calibrated at the onset of the data collection phase. Overseen and verbally instructed by a researcher, the test was performed three times by each hand while the participant was in a seated position, their arm laid at natural adduction and elbow bent to 90°. The dynamometer scores were measured in kilograms/force (kg/force).

3.1.3 Mobility

The timed-up-and-go test [TUG] was utilized to assess and quantify the basic functional mobility of the participants (PODSIADLO; RICHARDSON, 1991). A standard TUG test which measured the amount of time it took for a

participant to transfer from a seated to a standing position, walk three meters forward, turn around and return to a seated position. Participants were permitted to utilize any assistive instrument they required and test administrators provided verbal cues when necessary, although no physical assistance from another person was permitted.

3.2 Statistical analysis

A descriptive analysis of the data was performed, calculating frequencies and proportions for categorical variables and mean, median and standard deviations for continuous variables. ANOVA were used to compare the means of the quality of life according to handgrip strength and mobility of the older adults. The analyses were performed in STATA software (Stata Corporation, College Station, Texas) version 12.0., considering a level of significance of 5%.

3 Results

A total of 127 Brazilian elders participated in our study, however, only 114 residing in long term care facilities; completed the dynamometer test and 70 participants completed the TUG test. Table 1 presents the distribution of demographic and measured variables for the sample population.

Table 1 – Demographic variables of the 127 institutionalized older adults.

Variables	Frequency of no. of cases and percentage (%)
Age (years)	
60 to 69	41 (32,3)
70 to 79	47 (37)
80 to 89	31 (24,4)
Over 90	8 (6,3)
Marital status	
Single	55 (43,3)
Married	21 (16,5)
Widower	27 (21,3)
Divorced	24 (18,9)

Variables	Frequency of no. of cases and percentage (%)
Institutionalization time (years)	
Up to 5	88 (69,3)
5 to 10	22 (17,3)
10 to 15	7 (5,5)
Over 15	10 (7,9)
Education level	
Illiterate	34 (26,8)
1 - 8 years of formal education	79 (62,2)
8 -14 years of formal education	8 (6,30)
14 -16 years of formal education	6 (4,73)

Source: Author's data.

To account for the large variance in HS and TUG scores, participants were scaled in percentiles and the results of the analysis of variance can be seen in Table 2. Greater handgrip strength was significantly associated with a higher score on the Physical Health ($p = 0.002$) and Environment ($p = 0.028$) domains, as well as the global WHOQOL-BREF score ($p = 0.007$). This result implies that the overall relationship with the global WHOQOL-BREF score by handgrip strength is due to significant differences in only a few domains. Additionally, the Social Participation ($p = 0.058$) and Past, Present, & Future Activities ($p = 0.065$) domains of the WHOQOL-OLD neared significance, but did not meet the threshold. To account for the large variance in TUG scores, participants were scaled in quartiles based on time to complete the TUG and compared their scores on the WHOQOL surveys. The results of the TUG demonstrated no correlations with any domain of either WHOQOL survey even approaching significance (Table 2).

Table 2 – Means WHOQOL -BREF according to TUG and Handgrip Strength.

WHOQOL -BREF Domain	TUG – Mean (\pm SD)				p-value	Handgrip Strength – Mean (\pm SD)			
	< 25%	25% to 50%	50% to 75%	> 75%		< 25%	25% to 75%	> 75%	p-value
Physical Health	70.1 (19.9)	67.0 (17.1)	61.9 (14.5)	60.1 (15.2)	0.256	52.6 (16.9)	61.8 (17.1)	69.0 (16.5)	0.002*
Psycholo- gical	69.1 (19.9)	65.2 (17.9)	61.6 (15.4)	64.8 (21.6)	0.688	56.4 (18.3)	62.4 (18.4)	67.4 (17.9)	0.075
Social	73.7 (18.7)	66.7 (16.9)	67.1 (23.0)	72.2 (15.4)	0.563	62.2 (20.5)	61.2 (19.9)	69.6 (15.1)	0.147
Environ- ment	67.8 (18.3)	60.8 (17.1)	61.5 (14.3)	65.1 (14.2)	0.510	54.6 (16.7)	59.9 (15.8)	66.2 (16.7)	0.028*
Global	70.2 (15.3)	64.9 (12.9)	63.0 (11.8)	65.6 (13.0)	0.413	56.5 (14.2)	61.3 (13.8)	68.1 (12.9)	0.007*

Source: Author's data.

* Correlation is significant at the 0.05 level.

4 Discussion

This examination showed mixed results regarding the original hypothesis of significant associations amongst domains of Quality of Life with mobility and handgrip strength, measured by TUG and dynamometer, in a sample of older adults residing in long-term care among the investigated population. The primary findings of this study demonstrate: (i) greater HS scores were significantly associated with increased global WHOQOL-BREF scores and two of its domains, Physical Health and Environment; and (ii) no relationship between the TUG times and any measured domain of QoL in the sample population.

With respect to the distribution of measured variables of the sample, it was unusual to enroll a greater number of males; a reflection of the social, psychological and health-related gender differences in the aging process, studies of older adults typically enroll more females (CUCATO *et al.*, 2016; LACERDA *et al.*, 2017; MUSALEK; KIRCHENGAST, 2017; TOMICKI *et al.*,

2016; RODRIGUES; MOLNAR; ABREU, 2016; VARELA *et al.*, 2015; VITORINO; PASKULIN; VIANNA, 2013).

The non-significance of the TUG with either WHOQOL survey runs contrary to the hypothesized results; considering mobility is a determining facet of the Physical Health domain (WHO, 1996), it was expected that this domain would represent the strongest association with TUG times. Some explanatory theories were developed to address this discrepancy with the hypothesis. First, mobility limitations have been shown to increase the level of dependence (SOUZA-KOCK; BISETTO, 2017), likelihood of institutionalization (WEBBER *et al.*, 2010), and negatively influence the QoL of Brazilian older adults (PAULA *et al.*, 2014). However, in this study, it was not possible to achieve the desired size in the sample calculation. In addition, the mean completion time for the TUG (29.10 secs; SD=40.7) was inflated and highly variable relative to the mean score (19.25 secs; SD=8.52) of another, small sample (n=10) of institutionalized older adults (LEÃO *et al.*, 2017). Thus, the observed non-significance with QoL may be attributed to the noteworthy variance in the TUG times. This rationalization is further evidenced by previous studies of older adults in various settings that have established a significant correlation between HS and TUG times (BRITO *et al.*, 2015), which was not corroborated by the present results.

One of three determinants for frailty in older adults (ROBERTS *et al.*, 2011), HS is indicative of upper-body and overall muscle strength. Declines in muscle strength have been shown to result in declines in QoL, a particular area of concern for institutionalized older adults due to age-related muscle loss known as sarcopenia (LACOURT; MARINI, 2006). In contrast to TUG, the significance of HS with some WHOQOL domains fulfilled the original hypothesis. The significant associations with the Physical Health and Environment domains indicate that the relationship between muscle strength on the QoL are largely defined by the ability of residents to maintain a degree of control over their surrounding environment following institutionalization. This was partially supported by the literature; a sample of community-dwelling older adults in Austria found that HS was only significantly related with the global WHOQOL score ($\beta=0.292$; p-value=0.017), although the Physical Health ($\beta=-0.077$; p-value=0.540) and Environment ($\beta=0.026$; p-value=0.836) did not (HAIDER *et al.*, 2016).

The applicability of the present study for eldercare providers and administrators are primarily based on the result that muscular strength declines are associated with reduced QoL (LACERDA *et al.*, 2017; RIZZOLI *et al.*, 2013). Although physical activity does improve QoL for institutionalized older adults (VITORINO; PASKULIN; VIANNA, 2012), it is important to also incorporate

programs which address the environmental determinants modifiable by strength (CUCATO *et al.*, 2016; LACERDA *et al.*, 2017). According to Cucato *et al.* (2016), a comprehensive rehabilitation program which incorporates health and social support through engaging stimulus was the impetus for the comparable HS and TUG performance between institutionalized and community-dwelling older adults in Brazil. Alves-Silva *et al.* (2013) stress the importance of these tasks creating a sense of purpose and productivity to counter the negative psychological impacts associated with institutionalization.

The main limitations of this study are borne out of size sample cue that was not achieved for assessment of mobility. Additionally, the exclusion of participants who demonstrated cognitive deficiencies and big TUG score variance may have caused the results to not accurately reflect mobility. Finally, its cross-sectional design and the small sample do not allow for the determination of causality amongst significantly associated results. Replication and examination in a longitudinal design to establish causality between HS and Quality of Life may offer potentially beneficial avenues to strengthen the validity of these results.

5 Conclusions

Our results showed no significant difference in quality of life domains between TUG score. However, the Physical and Environmental domains of quality of life were greater in the older adults with better grip strength levels. We concluded that strength appears to have a positive impact on some determinants of quality of life in the investigated population, which healthcare providers in long-term care should account for when designing interventions to this particular population.

ANÁLISE COMPARATIVA DA INFLUÊNCIA DA FORÇA E MOBILIDADE DA PREENSÃO MANUAL NA QUALIDADE DE VIDA DE IDOSOS INSTITUCIONALIZADOS

resumo

O objetivo desse estudo foi realizar uma análise comparativa entre a força de preensão manual e a mobilidade na qualidade de vida de idosos residentes em Instituições de longa permanência. Este foi um estudo transversal conduzido no município de Belo Hori-

zonte, Brasil, envolvendo uma amostra de 127 idosos institucionalizados. As medidas incluíram os questionários de Qualidade de Vida propostos pela Organização Mundial de Saúde (WHOQOL- BREF), avaliação da força de preensão manual pelo dinamômetro manual e a mobilidade pelo *Timed Up and Go* (TUG). Foi realizada uma análise de variância (ANOVA) para comparar os valores médios do WHOQOL BREF, total e por domínio, em cada estrato dos valores da força de preensão manual e de mobilidade. Os resultados mostraram que foram observados diferenças significativas nos escore global do WHOQOL BREF e nos domínios meio ambiente ($p < 0.028$) e físico ($p < 0.002$) entre os estratos da força de preensão manual, ou seja, os maiores valores da QV foram vistos naqueles idosos com maior força de preensão. Por outro lado, não houve diferença nas médias do WHOQOL, total e por domínio, em nenhum dos estratos do TUG. Pode-se inferir que a força de preensão parece influenciar na qualidade de vida em idosos institucionalizados, devendo, pois, aos gestores das instituições de longa permanência levar em consideração essa informação ao propor intervenções para essa população.

palavras-chave

Dinamômetro de força muscular. Qualidade de vida. Idoso. Lar para idosos.

references

ALVES-SILVA, Júnia Denise; SCORSOLINI-COMIN, Fabio; DOS SANTOS, Manoel Antônio. Idosos em instituições de longa permanência: desenvolvimento, condições de vida e saúde. *Psicologia: reflexão e crítica*, Porto Alegre, v.26, n.4, p.820-830, out/dez. 2012. Disponível em: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0102-79722013000400023 Acesso em: 03 de Julho de 2018.

BRITO, Aralice Oliveira. *Correlation between the manual gripping force with the functional reach test and the Timed Up and Go test*. (Unpublished Master's Thesis). Universidade Católica de Brasília, Brasília. 2015. Disponível em: <https://bdtd.ucb.br:8443/jspui/handle/123456789/1208>. Acesso em: 20 de Julho de 2018.

BRUCKI, Sonia M.D.; NITRINI, Ricardo; CARAMELLI, Paulo; BERTOLUCCI, Paulo H.F.; OKAMOTO, Ivan H. Suggestions for utilization of the mini-mental state examination in Brazil. *Arquivos de neuro-psiquiatria*, São Paulo, v.61, p.777-781. 2003. Disponível em: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0004-282X2003000500014. Acesso em: 10 de Agosto de 2018.

CUCATO, Gabriel Grizzo *et al.* Health-related quality of life in Brazilian community-dwelling and institutionalized elderly: Comparison between genders. *Revista da Associação Médica Brasileira*, São Paulo, v. 62, p. 848-852. 2016. Disponível em: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0104-42302016000900848. Acesso em: 10 de Agosto de 2018.

FABER, Livia Marcondes. *Comparação do equilíbrio estático e mobilidade entre idosos institucionalizados e moradores da comunidade*. (Unpublished Master's thesis). Universidade Estadual Paulista. Rio Claro, Brazil. 2017. Disponível em: <https://repositorio.unesp.br/handle/11449/150340>. Acesso em: 03 de Julho de 2018.

FLECK, Marcelo P; CHACHAMOVICH, Eduardo; TRENTINI, Clarissa. Development and validation of the Portuguese version of the WHOQOL-OLD module. *Revista de Saúde Pública*, Rio de Janeiro, v. 40, n. 5, p. 785-791.2006. Disponível em: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0034-89102006000500007. Acesso em: 10 de Agosto de 2018.

HAIDER, Sandra *et al*. Associations between daily physical activity, handgrip strength, muscle mass, physical performance and quality of life in prefrail and frail community-dwelling older adults. *Quality of Life Research*, [s.i.], v. 25, n. 12, p. 3129-3138. 2016. Disponível em: <https://link.springer.com/article/10.1007%2Fs11336-016-1349-8> Acesso em: 03 de Julho de 2018.

LACERDA, Tatiana Teixeira Barral; HORTA, Natália de Cássia; SOUZA, Marina Celly Martins Ribeiro, DE OLIVEIRA, Tatiana Resende Prado Rangel, MARCELINO, Karla Geovani Silva; FERREIRA, Quesia Nayrane. Characterization of long-term care facilities for the elderly in the metropolitan region of Belo Horizonte. *Revista Brasileira de Geriatria e Gerontologia*, Rio de Janeiro, v.20, n.6, p.743-753. 2017. Disponível em: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S1809-98232017000600743. Acesso em: 03 de Julho de 2018.

LACOURT, Marcelle Xavier; MARINI, Lucas Lima. Decréscimo da função muscular decorrente do envelhecimento e a influência na qualidade de vida do idoso: uma revisão de literatura. *Revista Brasileira De Ciências Do Envelhecimento Humano*, Passo Fundo, v. 3, n. 1. 2006. Disponível: <http://seer.ufp.br/index.php/rbceh/article/view/51> Acesso em: 20 de Julho de 2018.

LEÃO, Raíla Oliveira; DE CARVALHO, Natane Moreira; CHAVES, Carolina Marques Carvalho Mitre; PERNAMBUCO, Andrei Pereira. Análise comparativa da capacidade funcional de idosos institucionalizados e não institucionalizados. *Revista Fisi Senectus*, Chapecó, v. 5, n. 1, p. 3-12. 2017. Disponível em: <https://bell.unochapeco.edu.br/revistas/index.php/fisisenectus/article/view/3717> Acesso em: 20 de Julho de 2018.

LUCA D'ALESSANDRO, E.; BONACCI, S.; GIRALDI, G. (2011). Aging populations: the health and quality of life of the elderly. *La Clinica Terapeutica*, [s.i.], v.162, n.1, p.13-8. 2011. Disponível em: <https://www.ncbi.nlm.nih.gov/pubmed/21448536> Acesso em: 03 de Julho de 2018.

MIRANDA, Gabriella M. D.; MENDES, Antonio C. G.; SILVA, Ana L. A. Population aging in Brazil: current and future social challenges and consequences. *Brazilian journal of geriatrics and gerontology*, Rio de Janeiro, v. 19, p. 507-519. 2016. Disponível em: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S1809-98232016000300507. Acesso em: 03 de Julho de 2018.

MUSALEK, Christina; KIRCHENGAST, Sylvia. Grip Strength as an Indicator of Health-Related Quality of Life in Old Age: A Pilot Study. *International journal of environmental research and public health*, [s.i.], v. 14, 1447. 2017. Disponível em: <http://www.mdpi.com/1660-4601/14/12/1447> Acesso em: 03 de Julho de 2018.

NETUVELI, Gopalakrishnan; BLANE, David. Quality of life in older ages. *British medical bulletin*, Oxford, v. 85, p. 113-126. 2008. Disponível em: <https://academic.oup.com/bmb/article/85/1/113/291398> Acesso em: 10 de Agosto de 2018.

PAULA, Juliana Mariade; SAWADA, Namie Okino; NICOLUSSI, Adriana Cristina; ANDRADE, Cristiane Tomaz de Aquino Exel; ANDRADE, Viviane. Quality of life of elderly people with impaired physical mobility. *Northeast Network Nursing Journal*, Fortaleza, v. 14, n. 6. 2014. Disponível em: <http://www.periodicos.ufc.br/index.php/rene/article/view/3749> Acesso em: 10 de Agosto de 2018.

PODSIADLO, Diane; RICHARDSON, Sandra. The timed "Up & Go": a test of basic functional mobility for frail elderly persons. *Journal of the American Geriatrics Society*, [s.i.], v. 39, p. 142-148. 1991. Disponível em: <https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1532-5415.1991.tb01616.x> Acesso em: 20 de Julho de 2018.

RIZZOLI, René *et al.* Quality of life in sarcopenia and frailty. *Calcified tissue international*, [s.i.], v. 93, p.101-120. 2013. Disponível em: <https://link.springer.com/article/10.1007%2Fs00223-013-9758-y> Acesso em: 10 de Agosto de 2018.

ROBERTS, Helen C *et al.* A review of the measurement of grip strength in clinical and epidemiological studies: towards a standardised approach. *Age and ageing*, Oxford, v.40, p.423-429. 2011. Disponível em: <https://academic.oup.com/ageing/article/40/4/423/46964> Acesso em: 03 de Julho de 2018.

RODRIGUES, Natalia Camargo; MOLNAR, Patrícia; DE ABREU, Daniela Cristina Carvalho. Avaliação funcional em idosos institucionalizados e não institucionalizados, independentes para a marcha. *Estudos Interdisciplinares sobre o Envelhecimento*, Porto Alegre, v.21, p.105-118. 2016. Disponível em: [file:///C:/Users/Poliana/Downloads/51750-323147-1-PB%20\(1\).pdf](file:///C:/Users/Poliana/Downloads/51750-323147-1-PB%20(1).pdf) Acesso em: 20 de Julho de 2018.

SOUZA-KOCK, Kelsier; BISETTO, André. Nível de independência, força de preensão manual e deambulação em idosos institucionalizados e idosos participantes de grupos de convivência. *Revista Kairós: Gerontologia*, São Paulo, v. 20, n. 3, p. 113-130. 2017. Disponível em: <https://revistas.pucsp.br/index.php/kairos/article/view/35741>. Acesso em: 20 de Julho de 2018.

TAVARES, Darlene Mara dos Santos; DIAS, Flavia Aparecida. Functional capacity, morbidities, and quality of life of the elderly. *Texto e Contexto em Enfermagem*, Florianópolis, v.21, n.1, p.112-120. 2012. Disponível em: http://www.scielo.br/scielo.php?pid=S0104-07072012000100013&script=sci_arttext&lng=en Acesso em: 03 de Julho de 2018.

TOMICKI, Camila; ZANINI, Sheila Cristina Cecagno; CECCHIN, Luana; BENEDETTI, Tania Rossane Bertoldo; PORTELLA, Marilene Rodrigues; LEGUISAMO, Camila Pereira. Effect of physical exercise program on the balance and risk of falls of institutionalized elderly persons: a randomized clinical trial. , Rio de Janeiro, v. 19, p. 473-482. 2016. Disponível em: http://www.scielo.br/scielo.php?script=sci_arttext&id=S1809-98232016000300473 Acesso em: 03 de Julho de 2018.

VARELA, Flavia Reginade Andrade; CICONELLI, Rozana Mesquita; CAMPOLINA, Alessandro Gonçalves; SOAREZ, Patrícia Coelho de. Quality of life evaluation of frail elderly in Campinas, São Paulo. , São Paulo, v. 61, p. 423-430. 2015. Disponível em: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0104-42302015000500423 Acesso em: 20 de Julho de 2018.

VITORINO, Luciano Magalhães; PASKULIN, Lisiane Manganelli Girardi; VIANNA, Lucila Amaral Carneiro. A. Quality of life among older adults resident in long-stay care facilities. , Ribeirão Preto, v. 20, p.1186-1195. 2012. Disponível em: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0104-11692012000600022 Acesso em: 03 de Julho de 2018.

VITORINO, Luciano Magalhães; PASKULIN, Lisiane Manganelli Girardi; VIANNA, Lucila Amaral Carneiro. Quality of life of seniors living in the community and in long term care facilities: a comparative study. *Revista Latino-Americana de Enfermagem*, Spec Number, p. 3-11. 2013. Disponível em: http://www.scielo.br/scielo.php?script=sci_arttext&id=S0104-11692013000700002. Acesso em: 10 de Agosto de 2018.

WEBBER, Sandra C.; PORTER, Michelle M.,; MENEZ, Verena H. Mobility in older adults: a comprehensive framework. *The Gerontologist*, Oxford, v. 50, p. 443-450. 2010. Disponível em: <https://academic.oup.com/gerontologist/article/50/4/443/743504> Acesso em: 03 de Julho de 2018.

WHO. WORLD HEALTH ORGANIZATION. *WHOQOL-BREF*: introduction, administration, scoring and generic version of the assessment: field trial version, December 1996. Disponível em: www.who.int/mental_health/media/en/76.pdf Acesso em: 20 de Julho de 2018.

Received: 06/09/2018
Accepted: 20/10/2020